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EXAMINER	
MACAULEY, SHERIDAN R	

ART UNIT	PAPER NUMBER
1651	

NOTIFICATION DATE	DELIVERY MODE
02/06/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/589,580	MITANI ET AL.	
	Examiner	Art Unit	
	SHERIDAN R. MACAULEY	1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-12* is/are pending in the application.

4a) Of the above claim(s) *4* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 5-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/22/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

A response and amendment were received and entered on October 27, 2008. All evidence and arguments have been fully considered. Claim 2 has been cancelled. New claims 5-12 have been added. Claims 1 and 3-12 are pending. Claim 4 is withdrawn from consideration due to a previous requirement for restriction. Claims 1, 3 and 5-12 are examined on the merits in this office action.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. The term "the biomass that contains non-hydrogen fermenting microorganisms" in lines 10-11 of claim 1 renders the claim and its dependents indefinite. It is unclear whether "the biomass that contains non-hydrogen fermenting microorganisms" refers to the same biomass recited in line 5 of the claim or whether it refers to a different biomass. If the former, it is recommended that a term such as "wherein the biomass contains non-hydrogen fermenting microorganisms," or some acceptable term, be added. If the latter, it is recommended that the term be amended to "a biomass that contains non-hydrogen fermenting microorganisms," or some acceptable term.

4. Claim 5 is rendered indefinite by the term "hydrogen fermentation of a liquid biomass containing a glucide substrate by at least one hydrogen-fermenting microorganism(s) and a contaminant microorganism that inhibits hydrogen fermentation" in lines 1-3 of the claim. It is unclear whether applicant is claiming (a) that the hydrogen fermentation is carried out by at least one hydrogen-fermenting microorganism(s) and a contaminant microorganism or (b) that the liquid biomass contains a glucide substrate and a contaminant organism.

5. Claim 5 is further rendered indefinite by the recitation of "the maximium" in line 6 of the claim. It is unclear whether applicant refers to the "maximum tolerable concentration of the substrate" or some other maximum.

Claim Rejections - 35 USC § 102

6. Rejections under 35 USC 102 have been withdrawn due to amendment.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1, 5, 6 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi (US 5,350,685; document cited in previous action) in view of Noike (International Journal of Hydrogen Energy, 2002, 27:1367-1371. The claims recite a method for producing a biogas, comprising determining a maximum tolerable concentration of a glucide in a liquid biomass and generating a biogas comprised of hydrogen by causing the hydrogen-producing microorganisms to ferment the biomass at or below the maximum tolerable concentration, wherein the biomass contains a contaminant microorganism that inhibits hydrogen fermentation of the substrate. Dependent claims recite the limitations that the non-hydrogen fermenting bacteria are lactic acid bacteria and that the hydrogen-fermenting microorganism produces an

organic acid from the substrate and a biogas that is a mixture of hydrogen and carbon dioxide.

11. Taguchi teaches a method for producing a biogas comprised of hydrogen by causing hydrogen-fermenting microorganisms to ferment a liquid while keeping the substrate in the liquid to be processed at a concentration not higher than a maximum concentration (abstract, col. 7, lines 36-69). Taguchi teaches that the substrate may be a heterogeneous carbohydrate source (i.e., a glucide) and teaches the determination of a correlation between a concentration of the substrate and the rate of consumption of the substrate (measured as the production of hydrogen gas (col. 7, lines 36-69, col. 8, lines 43-51). The reference does not specifically teach the utilization of a substrate containing contaminating lactic acid bacteria.

12. Noike teaches a method for producing hydrogen from a biomass by a mixture of hydrogen-fermenting microorganisms and a contaminant microorganism that inhibits hydrogen fermentation of the biomass (lactic acid bacteria; abstract). Noike teaches that the inhibition may be reduced by preventing the growth of the lactic acid bacteria (abstract).

13. At the time of the invention, a method of producing a biogas from a glucide substrate comprising nearly all of the claimed elements was known, as taught by Taguchi. It was also known that substrates for hydrogen production often contain contaminating lactic acid bacteria, as taught by Noike (see p. 1369, section 3.1). One of ordinary skill in the art would have been motivated to produce hydrogen using a glucide substrate containing lactic acid bacteria because Noike teaches the desirability of

producing hydrogen utilizing many types of organic wastes (p. 1367, col. 2). One would further have been motivated to optimize the concentration of the substrate because Taguchi teaches that it is desirable to do so when producing hydrogen from a glucide. As acknowledged in applicant's specification, the hydrogen-producing microorganisms would have inherently produced hydrogen, carbon dioxide and organic acids (see specification, p. 10, par. 21). One of ordinary skill in the art would have had a reasonable expectation of success combining these teachings to arrive at the claimed invention because hydrogen production from a glucide, such as one containing lactic acid bacteria, was known, as taught by the cited references. It would therefore have been obvious to one of ordinary skill in the art to combine the teachings discussed above to arrive at the claimed invention.

14. Claims 1, 3, 5, 6 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi in view of Noike as applied to claims 1, 5, 6 and 9-11 above, and further in view of Kishimoto (JP 61-008200, see English abstract; documents cited in previous action). Claims 1, 5, 6 and 9-11 are discussed above. Claims 3 and 12 recite the method of claim 1 further comprising a third step of generating a fermentation gas comprised of methane by causing a methane-fermenting microorganism to methane-ferment the fermented liquid after the hydrogen fermentation in the second step and that the organic acid produced by fermentation with the hydrogen-fermenting microorganism is subsequently subjected to fermentation with at least one microorganism that generates methane.

15. The teachings of Taguchi and Noike are discussed above. For the reasons discussed above, it would have been obvious to combine their teachings to arrive at nearly all elements of the claimed invention. Neither reference, however, teaches that the products of the fermentation with the hydrogen-fermenting microorganism are subsequently subjected to fermentation with at least one microorganism that generates methane.

16. Kishimoto teaches a method of producing a biogas using a process wherein decomposed organic matter and hydrogen produced in previous steps are fed into a system wherein methane gas is produced by methane-producing organisms.

17. At the time of the invention, a method for the production of biogas by fermentation comprising nearly all of the claimed elements was known, as taught by Taguchi and Noike. It was further known that fermented organic matter could be used for the production of methane, as taught by Kishimoto. One of ordinary skill in the art would have been motivated to combine these teachings because Taguchi teaches the use of hydrogen-fermenting organisms for the decomposition of organic matter and Kishimoto teaches the use of decomposed organic matter as a substrate for methane-producing organisms. One would thus have recognized that the method of Taguchi and Noike could be combined with the method of Kishimoto for the enhanced yield of biogas described by Kishimoto. One would have had a reasonable expectation of success because the production of the claimed biogases were known in the art at the time of the invention, as was the combination of multiple fermentations, as taught by each of the

references. It would therefore have been obvious for one of ordinary skill in the art to combine the teachings discussed above to arrive at the claimed invention.

18. Claims 1 and 5-11 rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi in view of Noike as applied to claims 1, 5, 6 and 9-11 above, and further in view of Maye (US 2004/00440878 A1). Claims 1, 5, 6 and 9-11 are discussed above. Claims 7 and 8 recite the limitations that a hop or hop component is added to the biomass and that the biomass is not heated or warmed to inactivate inhibiting bacteria.

19. The teachings of Taguchi and Noike are discussed above. For the reasons discussed above, it would have been obvious to combine their teachings to arrive at nearly all elements of the claimed invention. Neither reference, however, teaches the addition of a hop or hop component, specifically not to inhibit lactic acid bacteria in the absence of heat.

20. Maye teaches the use of hop acids to inhibit lactic acid bacteria in the production of fuel ethanol (abstract).

21. At the time of the invention, it would have been obvious to combine the teachings of Taguchi and Noike to arrive at nearly all elements of the claimed invention. It was further known at the time of the invention that hop acids could be added to fermentation for the inhibition of lactic acid bacteria, as taught by Maye. One of ordinary skill in the art would have been motivated to combine these teachings because Noike teaches the desirability of inhibiting lactic acid bacteria in a method of fermentation using hydrogen-producing microorganisms (abstract) and Maye teaches a method of inhibiting lactic

acid bacteria. One would therefore have recognized that the methods of Maye could have been applied to the fermentations described by Taguchi and Noike. One would have had a reasonable expectation of success in adding hop acids to the combined method of Taguchi and Noike because Maye teaches that hops components are well-known as an additive for fermentation media (p. 3, par. 20-23). It would therefore have been obvious to one of ordinary skill in the art to combine the teachings of the prior art to arrive at the claimed invention.

22. Thus, the claimed invention as a whole was *prima facie* obvious over the combined teachings of the prior art.

Response to Arguments

23. Applicant's arguments with respect to the rejections under 35 USC 103 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHERIDAN R. MACAULEY whose telephone number is (571)270-3056. The examiner can normally be reached on Mon-Thurs, 7:30AM-5:00PM EST, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SRM

/Ruth A. Davis/
Primary Examiner, Art Unit 1651